

Volume 5, Issue 1, April 2008

Genetic Models of Disease Resistance in Livestock: “What Does Our Conscience Want?”

*Kenneth M Boyd**

Abstract

This paper derives from a 2007 European Science Foundation Workshop on genetic models of disease resistance in livestock. Research in this area, enabled by ‘expanding knowledge of the genomics of key livestock diseases, together with the latest techniques on genetic modification,’ the organisers stated, is likely to have a ‘major impact on animal welfare, food safety, the economy of the sector and human health.’ What ethical issues are raised by this? The author was invited to discuss them by addressing the question: “What does our conscience want?”

DOI: 10.2966/scrip.050108.161



© Kenneth M Boyd 2008. This work is licensed under a [Creative Commons Licence](#). Please click on the link to read the terms and conditions.

* Professor of Medical Ethics, College of Medicine and Veterinary Medicine, University of Edinburgh.

1. Introduction

‘What does our conscience want?’

Conscience is the process of reflecting on the morality of our actions and intentions: are they right or wrong, good or bad? The word ‘conscience’ literally means ‘knowing together,’ and it is sometimes compared to a court of law – an ‘inner court’ – where all the evidence and arguments about the morality of an action or intention are brought together for review and judgement. In that inner court, what most people want to hear is the verdict ‘not guilty.’ They want to be declared ‘innocent,’ or to have what in English is called a ‘clear’ conscience.

2. Conscience and Honesty

There are several reasons why that verdict may be difficult to pronounce. Although conscience may be like a court of law, it is a court in which the prosecutor, defender and judge are all the same person, and where the equivalent to a jury – all the people whose moral views and arguments we have heard from childhood to today – often speak with different and, especially in a modern pluralistic society, conflicting voices. With no authoritative and impartial judge, and a divided jury, the chances of achieving a ‘clear’ conscience are diminished. To be ‘clear,’ conscience has to be clear that all the evidence and arguments about the morality of an action or intention have been brought to light and judged impartially. But this, I suggest, can be difficult for the self-judging conscience to achieve: important issues may be ignored or fudged in the interest of self-justification, or minor issues may be exaggerated by over-scrupulous self-accusation. Honesty about oneself, in other words, is not easy.

In this context, a religious or philosophical belief that there is an ultimate judge or are absolute standards before whom or which actions and intentions must be judged, can be a strong incentive to be as honest as possible. But what the ultimate judge or absolute standards actually require in particular circumstances is still often a matter of interpretation on which different authorities disagree; and even when it seems clear that certain actions or intentions are wrong, the desire to be honest about whether or not one has avoided them, may obscure other issues equally important for conscience to consider. As noted above, what most people want, whatever their beliefs, is to be declared ‘innocent’ by conscience. ‘Innocent’ literally means ‘not causing harm,’ and the immediate thought is ‘not causing harm by one’s action.’ But while we may directly cause harm by ‘the things we have done that we ought not to have done,’ harm may also come about in the space left by the ‘things we have left undone that we ought to have done.’ To be clear, insofar as that is ever possible, conscience needs to be clear, not only about the benefits and harm which may flow from a particular action performed or proposed, but also about the cost, to others, of maintaining its own ‘innocence’ or integrity.

3. Conscience and Animal Health

Applying these considerations to the subject of genetic models of disease resistance in livestock, it could be argued that research into ways of improving animal health surely is something of which our conscience should approve, and that moral scruples about

genetic modification should not be allowed to get in the way of achieving this beneficent goal. If it was just as ethically simple as that however – that the end justifies the means – the question of what our conscience wants could be easily settled. But the ethical issues, I suggest, are more complicated, not only because the end aimed at by research has major implications for ‘food safety, the economy of the sector and human health’ as well as ‘animal welfare,’ but also because the means, techniques of genetic modification, raise ethical questions which go beyond mere moral scruples.

Whether the inclusion of ‘food safety, the economy of the sector and human health’ makes the end less or more deserving of conscience’s approval, is debateable. But for the present purpose, let us assume that improving animal health and welfare, or more specifically increasing disease resistance in farm animals, is the end in relation to which ethical questions about the means should be considered. A question which then immediately arises, however, is whether increasing disease resistance in farm animals is the same as improving their health and welfare.

‘Health’ is a tricky concept to define, at least in humans, particularly when it is seen as more than the absence of disease, or as ‘positive’ health. If, moreover, you examine how the word has come to be used about humans, it seems to be especially associated with youth, physical strength or athleticism and sexual vigour, characteristics carried over perhaps from the idea of a breeding animal at the peak of its performance. But how healthy actually is a top-flight athlete, not just at the moment of bursting the tape, but in terms that are sustainable? Being healthy can mean having the physical and mental resources to recover from being ill, or from being just plain exhausted, resources which might be prematurely drained if, never feeling ill or exhausted, we dashed about all the time with the boundless enthusiasm of Labrador Retrievers.

Relating this back to the more bovine health therefore, it may be difficult to entirely separate the idea of animal health from what we want farm animals to be healthy for, namely to produce food for human consumption. I’m not here conjuring up the image of Beltsville pigs, where as I understand it the aim was not health but productivity. But for our conscience to be clear, I suggest, the aim of increasing disease resistance in livestock must be one in which animal health-for-human-purposes is not incompatible with animal welfare, or health-for-their-own-sake. An obvious example is not seeking to increase livestock’s resistance to diseases which could equally be avoided by practical improvements in their environment and husbandry. A more problematic example would be if ‘a shorter life but a happier one’ was the result of increased disease resistance.

These may be questions on which a vet is better qualified to judge than an ethicist. But within the broad ethical formula I’ve suggested – that the end of increasing disease resistance in livestock must be one in which animal health-for-human-purposes is not incompatible with animal welfare, or health-for-their-own-sake – what about the *means*?

By genetic modification?

4. Conscience, Scientists and Genetic Modification of Animals

Genetic modification raises a variety of ethical questions. These include those concerned with the *unpredictability* of what is sometimes called ‘biological

engineering,' but differs from other forms of engineering in significant ways. As Hans Jonas once put it, there is:

... an important difference in "engineering" procedure. With hardware, the maker is the sole agent vis-à-vis the passive material. With organisms, the modifier is co-agent with the self-acting material, viz., the biological system, into whose self-activity he inserts the new fractional determinant, to be integrated into the totality of its autonomous determinants by their own working... This affects the important issue of predictability. In hardware engineering, the number of "unknowns" is practically nil, and the engineer can accurately predict the properties of his product. For the biological engineer, who has to take over "sight-unseen", the untold complexity of the given determinants with their self-functioning dynamics, the number of unknowns in the design is immense. To them he must commit his contributory share in the totality of causes. Prediction of its fate is thus reduced to guessing, planning – to gambling.¹

Now Jonas wrote that in the late 1960s or early 1970s, and it might be argued that scientific experience of genetic modification and European adoption of the 'precautionary principle' has since made 'biological engineering' much safer and less unpredictable. But a well reasoned paper on genetically modified organisms, published in 2007,² suggests that 'within risk assessment' it is still the case that 'scientific uncertainties are poorly integrated;³ and while some forms of genetic modification may pose fewer risks to humans, animals or the environment, than others do, it would be a bold scientist, I think, who could claim that any experiment in genetic modification was entirely risk-free, or that the measures taken to prevent harm resulting from it were infallible.

What does this say to the conscience of the scientist? Some might say that genetic modification is just too risky to proceed with any further. Not only is it interfering with Nature, it also sets us on a slippery slope (i.e.: to the nightmare world of Margaret Atwood's *Oryx and Crake*, in which 'ChickieNobs,' chickens which have been genetically modified and decerebrated, thereby solving the problem of food supply and animal suffering at a stroke, escape into the environment, together with 'pigoons,' vicious pigs who are also fiendishly clever because they have been genetically modified with human genes in order to produce organs for humans).⁴

¹ H Jonas, *Philosophical Essays from Ancient Creed to Technological Man* (1974), at 143.

² Y Devos *et al.*, "Ethics in the Societal Debate on Genetically Modified Organisms: A (Re)Quest for Sense and Sensibility" (2007) *Journal of Agricultural and Environmental Ethics* (DOI 10.1007/s10806-007-9057-6)

³ *Ibid.*

⁴ M Atwood, *Oryx and Crake* (2003). Incidentally, when I read the novel, I thought it rather far-fetched, but it is widely cited as a warning in a respectable academic paper published last year on 'ethical dimensions of the genetic engineering of animals for human consumption,' see T Warkentin, "Dis/integrating Animals: Ethical Dimensions of the Genetic Engineering of Animals for Human Consumption" (2006) 20 *AI & Soc.*, 82-102.

How does the scientist's conscience respond to that kind of warning? One thing to note, perhaps, is that arguments about not interfering with Nature often presuppose, without examining too closely, the idea that left to itself, Nature has its own ways of maintaining or re-establishing ecological stability. But while there is some general truth to that, it also avoids the question of humanity's role and history as *part* of Nature, and also the fact that human survival has always depended – and because Nature is never finally stable, always will depend – on interfering in some way with the rest of Nature. This suggests therefore that the question for the scientists' conscience is not whether, but how, it is right to interfere, and how to avoid sliding down the slippery slope. In the case of genetic modification of animals, there are at least three things that the scientist's conscience needs to consider:

1. the risks and burdens of the intervention in relation to the purpose for which it is proposed;
2. their own relationship to and responsibility for genetically modified animals;
3. sharing their aims and uncertainties with the wider public.

First, the risks and burdens of the intervention in relation to the purpose for which it is proposed. The risks of genetic modification are already assessed by legislators and regulators in terms of the, albeit variable, interpretations of the precautionary principle, and the burdens to animals are weighed against the purposes in the cost-benefit appraisals of well-regulated animal research. But for scientists to have as clear a conscience as possible, and to assist regulators in making what are always *judgements*, they need to see these issues not as a matter of getting something past the ethics committee or the regulator, but in the light of their own individual and collective conscientious judgement.

Another recent paper encouragingly suggests how this already happens.⁵ In the Netherlands, a sample of '35 persons from the practice of biomedical research who are directly involved in genetic engineering (scientists, biotechnicians, animal caretakers and laboratory animal scientists)' were presented with a list of 'applications of genetic engineering' and asked to say of which they disapproved, were neutral, or approved. Unsurprisingly, given their work, none disapproved of 'genetic engineering within scientific research.' But from a longer list: 23% disapproved of 'genetic modification of goats so that they produce spider silk material in their milk that can be used to produce stitching materials;' 36% disapproved of 'increasing the capacity of pigs to digest the phosphorus in their food, resulting in reduced phosphate content of their manure' (a contribution to environmental protection); 57% disapproved of increasing the production and reducing the fat content of pork; 85% disapproved of (a theoretical case reminiscent of Atwood's 'ChickieNobs') 'removing all properties of laying hens that are unnecessary for laying eggs, including their sentience;' and 97% disapproved of making hens blind as a solution to the problem of feather pecking.' Interestingly, for the present purpose, 54% disapproved, 20% were neutral and only 23% approved of 'increasing the resistance of pigs to production-related diseases.'⁶ How fine is the line between that

⁵ R de Vries, "Ethical Concepts Regarding the Genetic Engineering of Laboratory Animals" (2006) 9 *Medicine, Health Care and Philosophy*, 211-225.

⁶ *Ibid.*

‘increasing the resistance of pigs to production-related diseases’ and ‘increasing disease resistance in farm animals’?

Some other questions asked in this study bring us to the second thing I suggested that the scientist’s conscience should consider: their own relationship to and responsibility for genetically modified animals. These asked if the respondents endorsed the concept of animals’ ‘intrinsic value.’ Presented with the statements “Animals do not only have instrumental value, *i.e.*, they are not only valuable as means to our ends” and “Animals ought never to be treated solely as means,” 86% and 80% respectively fully agreed and none strongly disagreed. Moreover, 63% strongly agreed, and 29% agreed, with the statement that “Genetic engineering contributes to the instrumentalisation of animals, *i.e.*, the ever increasing adaptation of animals to our needs and interests.” While this may sound somewhat inconsistent coming from people ‘directly involved in genetic engineering,’ part of the reason why they were able to agree with the statement was that many of them argued that:

not every genetic modification interferes with the identity of the animal. In their view, only the modifications that cause significant changes in the appearance and/or the behaviour of the animals should be regarded as an interference with their identity and therefore as a violation of animal integrity.⁷

This stance may also reflect the experience that these respondents personally had of the individual genetically modified animals in their own laboratories. I realise that it is possible to be sentimental about animals, especially appealing ones like the late Dolly the sheep, but I am also aware that many people in animal laboratories, like many farmers, do *care about* as well as *care for* their animals.

In ethical terms, another author argues, ‘we have an obligation to tend to the interests of the beings that we create.’ This is most obvious in the case of children. But although we do not create them, we also have special obligations to pets for example; and in the case of vulnerable creatures, which would not have come into the kind of existence they have without genetic modification, there are ‘obligations to which we are bound *because* we have taken them on ourselves, because we have *created* these beings.’⁸

The ‘instrumentalisation’ of animals, whether in research or modified as a result of research, treating them as things, bio-machines existing solely as means to our ends, is a real moral risk of biotechnology, especially when all the interest is at the molecular level. The conscientious remedy for this however, is not to abandon the whole project of genetic modification, thereby possibly failing to do the things we ought to do, out of fear of doing the things we ought not to do. It is rather, to be discriminating about which things we ought and ought not to do, and in deciding this to be guided in part by the special obligations we take on ourselves to care for vulnerable creatures, which would not have come into the kind of existence they have without our creating them.

⁷ Ibid.

⁸ B Hale, “The Moral Considerability of Invasive Transgenic Animals” (2006) 19 *Journal of Agricultural and Environmental Ethics*, 337-366.

5. Conclusions

Though my emphasis has been on the conscience of scientists, a word needs to be said about another element that I suggested conscience should consider, namely its extension from scientists to the wider public. To this end let me briefly summarise the main argument of a paper on genetically modified organisms mentioned above.⁹ This paper is chiefly concerned with GM crops, but it argues that public attitudes to biotechnology generally, including the genetic modification of animals, have to be seen in the context of a ‘complex of concerns,’ ‘environmental, agricultural, socio-economic and ethical,’ which have emerged over the past 50 years, with growing public awareness, not always accurate, of what biotechnology is achieving and aiming to achieve, and with growing public distrust ‘in scientific institutions and expert systems’ which ‘reduce the complexity of the GMO issue to a solely scientific risk-based problem.’ As a remedy for this lack of trust, the authors take a metaphorical cue from Jane Austen’s novel *Sense and Sensibility*. The novel:

... describes the lives of two sisters, Marianna and Elinor. On the surface, these sisters seemingly represent two opposite poles. Marianna’s emotional and romantic nature represents the cult of “Sensibility,” whereas Elinor’s rationality represents the cult of “Sense.” However, just as much as the two sisters are next of kin, their natures/characters continually co-construct each other. The sisters thus symbolise a continuous and complex process of “giving sense to sensibility,” in which simultaneously “sensibility guides the making of sense.”¹⁰

Rational Elinor and emotional Marianna, these authors suggest, can be compared to the scientific community and public opinion. The only difference is that science and the public do not communicate with one another in the ‘co-constructive’ manner of the two sisters, and perhaps this must change.

Scientific attempts in the late 20th century to tell people ‘the facts’ about science, in the belief that if these were understood, the public would approve of biotechnology, failed to stem the tide of distrust. But the more recent model of ‘public engagement with science’ may be more promising. If the various shades of public sensibility are allowed greater participation in decision-making, particularly about risk assessment, public sensibility will need the help of scientific sense in order to make sense of the problems involved. By sharing not only its aims, but also its uncertainties and its decision-making with public sensibility, in other words, the scientific community may find a way of answering the question ‘What does our conscience want?’ that is more robust and reliable in the long run.

⁹ Y Devos *et al.*, note 2.

¹⁰ *Ibid.*